METHOD OF AND APPARATUS FOR AUTOMATICALLY PACKAGING ENCASED PRODUCT

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates to a method of and an apparatus for automatically packaging a given number of encased products, each comprising a product sealed in a case barrel and a cap mounted on the case barrel, in a packaging sheet.

Description of the Related Art:

It has been commonly practiced in the packaging industry to obtain an encased product by loading a product, such as a cartridge housing a rolled photographic photosensitive film, into a film case of synthetic resin, shrink-package a given number of encased products together into a shrink package, and cover the shrink package with an outer pack, thus producing a pillow-type packaged product.

Packaged products are available in a variety of forms. According to one form, a packaged product contains a single encased product. According to another form, a packaged product as a box packages a plurality of encased products therein, ranging from two to thirty encased products. According to still another form, two through five encased products are put together and placed in an outer pack, which will be hereinafter referred to as "assembly packaged product".

There are two types of assembly packaged products known in the art. According to one type, two through five encased products are sealed together in an outer pack while they are being arrayed with the case caps on the film cases being oriented in a direction across the direction in which the encased products are fed, i.e., while they are being arrayed abreast or side by side. According to the other type, two through three encased products are sealed together in an outer pack while they are being arrayed with the case caps being oriented in the direction in which the encased products are fed, i.e., while they are being arrayed in tandem or end to end.

Specifically, as shown in FIG. 15 of the accompanying drawings, a cartridge (product) 2 housing a rolled photographic photosensitive film is loaded into a film case (case barrel) 3, and a case cap 4 is attached to an open end of the film case 3, thus producing an encased product 5.

Then, a plurality of, e.g., two, encased products 5 are arranged in tandem or end to end, and shrink-packaged by a shrink sheet (packaging sheet) 6b, producing a tandem-arrayed shrink-packaged product 7b. Alternatively, four encased products 5, for example, are arrayed abreast or side by side, and shrink-packaged by a shrink sheet (packaging sheet) 6a, producing an abreast-arrayed shrink-packaged product 7a. The tandem-arrayed shrink-packaged product 7b and the abreast-arrayed shrink-packaged product 7a are sealed respectively in outer packs 8b, 8a, producing packed

products 9b, 9b.

Conventional packaging apparatus are only designed to automatically package the abreast-arrayed shrink-packaged product 7a. It has been customary in the art to manually package the tandem-arrayed shrink-packaged product 7b in the outer pack 8b. Therefore, the conventional packaging apparatus fail to efficiently meet requirements for the selective production of the abreast-arrayed shrink-packaged product 7a and the tandem-arrayed shrink-packaged product 7b, and are poor in applicability in the manufacture of differently packaged products.

SUMMARY OF THE INVENTION

It is a major object of the present invention to provide a method of and an apparatus for automatically and efficiently packaging differently oriented encased products with a simple process and arrangement.

In a method of and an apparatus for automatically packaging a given number of encased products according to the present invention, the encased products are forcibly arrayed to have their caps oriented in one direction, and then sorted selectively to a first feed path and a second feed path depending on the packaging pattern for the encased products. On the first feed path, the encased products are fed in a first attitude. On the second feed path, the encased products are fed in a second attitude which is different from the first attitude.

The encased products arrayed in the first attitude by the first feed path or the encased products arrayed in the second attitude by the second feed path are packaged by a packaging sheet. Therefore, a certain number of encased products can selectively and automatically be packaged in one of the different first and second attitudes. The apparatus is therefore highly flexible in applications, and is much more economic than if dedicated machines are used to package the encased products in the first and second attitudes.

The above and other objects, features, and advantages of the present invention will become more apparent from the following description when taken in conjunction with the accompanying drawings in which a preferred embodiment of the present invention is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic perspective view illustrative of a method of automatically packaging encased products according to the present invention;

FIG. 2 is a schematic plan view of an automatic packaging apparatus for carrying out the method of automatically packaging encased products;

FIG. 3 is a fragmentary perspective view of an arraying and supplying station of the automatic packaging apparatus;

FIG. 4 is a perspective view of rollers of the arraying and supplying station;

FIG. 5 is a perspective view of a sorting station of the automatic packaging apparatus;

FIG. 6 is a plan view of the sorting station;

FIG. 7 is a partial perspective view of a portion of a first feed path of the sorting station;

FIG. 8 is a plan view of the first feed path;

FIG. 9 is a perspective view of a cutter in a packaging station of the automatic packaging apparatus;

FIG. 10 is a perspective view of a presser in the packaging station;

FIG. 11 is a perspective view of a pillow packaging device of the automatic packaging apparatus;

FIG. 12 is a perspective view of a heater in the pillow packaging device;

FIG. 13 is a perspective view of a perforating roller in the pillow packaging device;

FIG. 14 is a perspective view of a tightening device of the automatic packaging apparatus; and

FIG. 15 is a view showing packaged patterns of encased products.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates a method of automatically packaging encased products according to the present invention, and FIG. 2 shows in plan an automatic packaging apparatus 10 for carrying out the method of automatically packaging encased products.

As shown in FIGS. 1 and 2, the automatic packaging apparatus 10 comprises an arraying and supplying station 12 for forcibly arraying and supplying encased products 5 with case caps 4 directed in one direction, e.g., upwardly; a sorting station 18 for selectively sorting encased products 5 into a first feed path 14 for arraying encased products 5 to package them in a first attitude or orientation and a second feed path 16 for arraying encased products 5 to package them in a second attitude or orientation which is different from the first attitude or orientation; a packaging station 20 for packaging a given number of encased products 5, which have been arrayed in the first attitude by the first feed path 14 or a given number of encased products 5 which have been arrayed in the second attitude by the second feed path 16, with shrink sheets (packaging sheets) 6a, 6b; a packing station (packaging station) 22 for sealing an abreast-arrayed shrink-packaged product 7a and a tandem-arrayed shrink-packaged product 7b respectively in outer packs 8a, 8b, producing packed products 9a, 9b; a corrugated case packing station 26 for placing a given number of packed products 9a, 9b in a corrugated cardboard case 24; and a palletizing station 28 for stacking a number of corrugated cardboard cases 24.

As shown in FIG. 3, the arraying and supplying station 12 comprises a container 30 for containing a number of encased products 5, a feeder 32 for successively feeding encased products 5 from the container 30, and a pair of

rollers 34a, 34b for supporting the case caps 4 of encased products 5 delivered from the feeder 32 and feeding the encased products 5 with the case caps 4 oriented upwardly in the direction indicated by the arrow A. The feeder 32 has an inclined feed surface 36 for supplying encased products 5 therealong to the rollers 34a, 34b with the case caps 4 facing forward or backward.

As shown in FIG. 4, the rollers 34a, 34b are rotatably supported at their opposite ends on a frame 38. The rollers 34a, 34b have respective outer circumferential surfaces spaced from each other by a minimum distance H which is greater than the diameter of the film cases 3 of encased products 5 and smaller than the diameter of the case caps 4 thereof. A motor 40 is mounted on an end wall of the frame 38 and has a drive shaft 40a to which a drive gear 42 is fixed. The drive gear 42 is held in mesh with a first gear 44 which is held in mesh with a second gear 46. The rollers 34a, 34b have respective ends operatively coupled to the first and second gears 44, 46 by belt-and-pulley means 48.

As shown in FIGS. 5 and 6, the sorting station 18 has a sorting device 60 disposed at a terminal end of a guide channel 50 for feeding encased products 5, in an upright orientation, in the direction of the arrow A with their case caps 4 directed upwardly. The sorting device 60 serves to selectively supply encased products 5 to first conveyor lines 52a, 52b which make up the first feed path 14, a second conveyor line 54 which makes up the second feed path

16, and a third conveyor line 56 for feeding defective products, which are devoid of case caps 4.

The sorting device 60 has a rotary base 64 angularly movable about a pivot shaft 62 selectively to different angular positions. A motor 66 is fixedly mounted on the lower bottom surface of the rotary base 64 and has an upwardly projecting drive shaft 66a to which a drive pulley 68 is secured. The drive pulley 68 is operatively coupled to first rotatable shafts 72a, 72b by belt-and-pulley means 70. The first rotatable shafts 72a, 72b are operatively coupled to respective second rotatable shafts 76a, 76b by respective feed belts 74a, 74b which are movable in a circulatory path in contact with the outer circumferential surfaces of encased products 5.

As shown in FIGS. 7 and 8, a first delivery unit 80 for feeding encased products 5 with the case caps 4 oriented upwardly is disposed at the distal end of the first conveyor line 52a of the first feed path 14. A second delivery unit 82 for reversing encased products 5 to orient the case caps 4 downwardly and thereafter discharging the reversed encased products 5 alternately with the encased products from the first delivery unit 80 is disposed at the distal end of the second conveyor line 52b of the first feed path 14.

The first and second delivery units 80, 82 have respective first and second screws 88, 90 rotatable about their axes by respective motors 84, 86. The first screw 88 is inclined from the distal end of the first conveyor line

52a toward the second delivery unit 82. The first screw 88 supports the case caps 4 mounted on encased products 5 with the inner wall surface of a spiral groove 92 defined in the outer circumferential surface of the first screw 88, and feeds the encased products 5 toward the second delivery unit 82 upon rotation of the first screw 88 about its own axis. The spiral groove 92 in the distal end portion of the first screw 88 has a pitch P1 set to an interval large enough to place another encased product 5 between two adjacent encased products 5 held by the groove 92.

The second screw 90 has a spiral groove 94 defined in the outer circumferential surface thereof. The spiral groove 94 has a pitch P2 over a given length from the upstream end of the second screw 90 in its feed direction, a pitch P3 following the pitch P2 for spacing reversed encased products 5 from each other, and a pitch P4 following the pitch P3 for alternately arranging reversed encased products 5 and encased products 5 from the first delivery unit 80 at given spaced intervals.

A pair of guides 96 are disposed such that one is on each side of an upstream portion of the second screw 90 and spaced from each other transversely and longitudinally of the second screw 90. The guides 96 have guide grooves 98 defined in their surfaces facing the second screw 90. The guide grooves 98 serve to reverse encased products 5 supported by the second screw 90 through 180° to orient the case caps 4 downwardly upon rotation of the second screw 90.

The second conveyor line 54 of the second feed path 16 feeds encased products 5 in the direction indicated by the arrow A with the case caps 4 oriented upwardly. As shown in FIG. 1, the encased products 5 while they are being fed by the second conveyor line 54 are knocked down backward in the feed direction by a knock-down member 99 shown in FIG. 1. The encased products 5 are fed with their case caps 4 positioned behind in the direction indicated by the arrow A.

The packaging station 20 is supplied with rolled sheets having different widths for producing the shrink sheet 6a which shrink-packages a given number of, e.g., five, abreast-arrayed encased products 5 and the shrink sheet 6b which shrink-packages a given number of, e.g., three, tandem-arrayed encased products 5. The packaging station 20 seals the encased products with the shrink sheets 6a, 6b in a three-sided pillow configuration, and heat-shrinks the shrink sheets 6a, 6b in a heating tunnel. The shrink sheets 6a, 6b have perforations 100a, 100b (see FIG. 1) which are defined therein at given positions thereon before they shrink-package the encased products 5.

The shrink sheets 6a, 6b are perforated by a cutter 102 shown in FIG. 9. The cutter 102 comprises a cutter blade 106 mounted on a bracket 104 and plates 108a, 108b disposed above and below the cutter blade 106 and projecting outwardly beyond the distal end of the cutter blade 106. The cutter blade 106 has saw-toothed cutting edges spaced at given intervals. The cutter 102 also comprises a bracket

110 disposed in confronting relation to the cutter blade 106. The bracket 110 has a reception slot 112 defined therein for receiving the cutter blade 106 therein, and also has grooves 114a, 114b defined therein above and below the reception slot 112 in horizontal alignment with the respective plates 108a, 108b.

As shown in FIG. 10 ,the packaging station 20 has a movable presser 116 for holding five tandem-arrayed encased products 5 together when the encased products 5 are packaged by the shrink sheet 6a. The presser 116 has a vertically movable support base 118 on which there are rotatably supported rollers 120a, 120b and a tension roller 122. Round belts 124a, 124b that are spaced from each other are trained under tension around the rollers 120a, 120b and the tension roller 122, and a pair of guide plates 126 are disposed such that one is on each side of the round belts 124a, 124b.

As shown in FIG. 2, the packing station 22 has a pillow packaging device (first sealing means) 130 and a tightening device (second sealing means) 132. As shown in FIG. 11, the pillow packaging device 130 has a former 134 for supplying outer packs 8a, 8b having different widths as rolled packing sheets, temporarily sealing (first seal) the outer packs 8a, 8b in a three-sided pillow configuration at front and rear ends of encased products 5, and joining transverse ends of the outer packs 8a, 8b at lower sides of the abreast-arrayed shrink-packaged product 7a and the tandem-arrayed shrink-

packaged product 7b.

As shown in FIG. 12, the former 134 has a heater 136 comprising a lower block 138 and an upper block 140. The lower block 138 and the upper block 140 have respective sets of grooves 142a, 142b defined therein for producing unsealed regions in areas of the outer packs 8a, 8b that are temporarily sealed.

The former 134 has a roller (perforating means) 146 (see FIG. 13) for forming perforations 144a, 144b (see FIG. 1) in given regions of the outer packs 8a, 8b before they are temporarily sealed, the perforations 144a, 144b being spaced at constant pitches over the entire length of the outer packs 8a, 8b in the direction in which the outer packs 8a, 8b are moved. As shown in FIG. 13, the roller 146 is positioned in the feed path of the outer packs 8a, 8b before they are pillow-packaged. The roller 146 has a roll 148 and a plurality of radially outwardly projecting needles 152 mounted on the outer circumferential surface of the roll 148 angularly spaced at equal angular intervals by a spring 150.

As shown in FIG. 14, the tightening device 132 has a first heater block 164 for initially pressing a first seal region 162 of the abreast-arrayed shrink-packaged product 7a, which serves as a hanger 160 of a packed product 9a; a second heater block 168 for pressing a second seal region 166 of the hanger 160, which is positioned outwardly of the first seal region 162, after the first heater block 164 presses the first seal region 162; and a third heater block

172 for pressing a third seal region 170, which serves as a shorter end of the packed product 9a opposite to the hanger 160. The tightening device 132 finally seals (second seal) the packed product 9a. An outer pack 9b is finally sealed by either the first through third heater blocks 164, 168, 172 or separate heater blocks (not shown).

As shown in FIG. 2, downstream of the tightening device 132, there are disposed a cooling device 180 for cooling the hanger 160 and a blanking device 182 for trimming the hanger 160 and cutting off the opposite ends of the outer pack 9a to produce round corners. Between the corrugated case packing station 26 and the palletizing station 28, there is disposed a printing and weight checking station 184 for printing expiration dates, emulsion numbers, and other information on the corrugated cardboard case 24 and the packed products 9a, 9b and checking the weights of the products to remove any excessively heavy products which are not in accord with standards. The palletizing station 28 stacks a predetermined number of corrugated cardboard cases 24, each loaded with packed products 9a, 9b, on a pallet 186.

Operation of the automatic packaging apparatus 10 thus constructed will be described below with respect to the method of automatically packaging encased products according to the present invention.

As shown in FIG. 3, a number of encased products 5 are filled in the container 30. Encased products 5 are delivered from the container 30 to the feeder 32, which

feeds the encased products 5 one by one to the inclined feed surface 36. The encased products 5 are supplied one by one to a space between the rollers 34a, 34b disposed over the inclined feed surface 36.

As shown in FIG. 4, the closest outer circumferential surfaces of the rollers 34a, 34b are spaced from each other by the distance H which is greater than the diameter of the film cases 3 of encased products 5 and smaller than the diameter of the case caps 4 thereof. The encased products 5 supplied between the rollers 34a, 34b are held in such an attitude or orientation that the case caps 4 are supported on the outer circumferential surfaces of the rollers 34a, 34b. The encased products 5 are forcibly arrayed to have their case caps 4 oriented in one direction, i.e., upwardly.

The motor 40 has been energized to rotate the drive gear 42 fixed to the drive shaft 40a, thus rotating the rollers 34a, 34b in different directions through the first and second gears 44, 46 and the belt and pulley means 48. Therefore, the encased products 5 with the case caps 4 supported on the outer circumferential surfaces of the rollers 34a, 34b are fed smoothly in the direction indicated by the arrow A toward the sorting station 18 (see FIG. 1).

In the sorting station 18, as shown in FIGS. 5 and 6, the rotary base 64 of the sorting device 60 is angularly moved to a certain angular position about the pivot shaft 62. If the abreast-arrayed shrink-packaged product 7a is to be obtained from encased products 5, then the sorting device 60

is turned into alignment with the first feed path 14, and delivers the encased products 5, one by one or a given number at a time, onto the first conveyor lines 52a, 52b of the first feed path 14.

Specifically, the encased products 5 with the case caps 4 oriented upwardly are fed down the guide channel 50 in the direction indicated by the arrow A, and introduced into the rotary base 64 of the sorting device 60. On the rotary base 64, the feed belts 74a, 74b have been moved in the circulatory path by the motor 66 through the belt and pulley means 70. The introduced encased products 5 are delivered to the first conveyor line 52a or 52b by the circulatory movement of the feed belts 74a, 74b.

As shown in FIG. 8, the encased products 5 delivered to the first conveyor line 52a are fed to the first delivery unit 80. In the first delivery unit 80, the case caps 4 of the delivered encased products 5 are supported by the wall surface of the groove 92 of the first screw 88 which has been rotated by the motor 84. The encased products 5 are fed toward the second delivery unit 82 with the case caps 4 oriented upwardly. At this time, the encased products 5 are spaced apart by the pitch P1 near the second screw 90 of the second delivery unit 82.

The encased products 5 delivered to the second conveyor line 52b are fed to the second screw 90 of the second delivery unit 82 that is disposed at the distal end of the first conveyor line 52b. The case caps 4 of the delivered

encased products 5 are supported by the wall surface of the groove 94 of the second screw 90 on one side thereof, while the second screw 90 is being rotated by the motor 86.

The guides 96 are disposed on both sides of an upstream portion of the second screw 90. As shown in FIGS. 7 and 8, the encased products 5 are reversed 180° by the groove 94 of the second screw 90 and the guide grooves 98 of the guides 96, and fed to the other side of the second screw 90. The encased products 5 are then arrayed with their case caps 4 oriented downwardly and fed in the direction indicated by the arrow A. After the encased products 5 are spaced at the pitch P2 and then the pitch P3, they are arrayed alternately with the encased products 5 delivered from the first delivery unit 80, at the pitch P4, whereupon they are fed to the packaging station 20.

In the packaging station 20, five encased products 5 are horizontally directed across the direction in which they are fed (see FIG. 1). The encased products 5 in this attitude (first attitude) are sealed by the shrink sheet 6a in a three-sided pillow configuration, and the shrink sheet 6a is heat-shrunk in the heating tunnel.

The perforations 100a have been defined in the shrink sheet 6a by the cutting blade 106 of the cutter 102 (see FIG. 9) before the shrink sheet 6a packages the encased products 5. As shown in FIG. 10, the presser 116 is actuated to prevent the encased products 5 from moving, e.g., rolling, at the time they are sealed by the shrink sheet 6a.

Specifically, the two round belts 124a, 124b of the presser 116 press the five encased products 5 to prevent the encased products 5 from rolling at the time they are sealed by the shrink sheet 6a.

The abreast-arrayed shrink-packaged product 7a thus produced is then delivered to the pillow packaging device 130 of the packing station 22. In the pillow packaging device 130, as shown in FIG. 11, the outer pack 8a is introduced into the former 134, and perforated to form the perforations 144a therein with the needles 152 of the roller 146 (see FIG. 13) that is located in the feed path of the outer pack 8a. Thereafter, the front and rear ends of the outer pack 8a are temporarily sealed in a three-sided pillow configuration.

As shown in FIG. 12, the heater 136 in the former 134 has the grooves 142a, 142b defined in the lower block 138 and the upper block 140. The grooves 142a, 142b produce unsealed regions in the front and rear areas of the outer pack 8a that is temporarily sealed, and air is removed from the outer pack 8a through the unsealed regions.

The packed product 9a which has been temporarily sealed by the pillow packaging device 130 is then sent to the tightening device 132. As shown in FIG. 14, the tightening device 132 tightens the outer pack 8a around the abreast-arrayed shrink-packaged product 7a, and finally seals (second seal) the outer pack 8a.

Specifically, the third seal region 170 as the shorter

end of the outer pack 8a is sealed by being pressed and heated by the third heater block 172. On the longer hanger 160, the first seal region 162 of the abreast-arrayed shrink-packaged product 7a is sealed by being pressed and heated by the first heater block 164. Then, after elapse of a given period of time, the second seal region 166 positioned outwardly of the first seal region 162 is sealed by being pressed and heated by the second heater block 168. The outer pack 8a is then tightly wrapped around the abreast-arrayed shrink-packaged product 7a, thus reliably packing the abreast-arrayed shrink-packaged product 7a.

The finally sealed packed product 9a is then fed to the cooling device 180 (see FIG. 2), where the hanger 160 is cooled, and then trimmed by the blanking device 182. The packed product 9a is then fed to the corrugated case packing station 26, where a given number of packed products 9a are automatically or manually placed in the corrugated cardboard case 24. Thereafter, the filled corrugated cardboard case 24 is sent to the printing and weight checking station 184. After having been printed and checked for weight in the printing and weight checking station 184, the corrugated cardboard case 24 is delivered to the palletizing station 28, where a given number of filled corrugated cardboard cases 24 are stacked on the pallet 186.

If the tandem-arrayed shrink-packaged product 7b is to be obtained from encased products 5, the sorting device 60 is turned into alignment with the second feed path 16, and

delivers the encased products 5 onto the second conveyor line 54 of the second feed path 16 (see FIGS. 5 and 6). On the second conveyor line 54, the encased products 5 are fed with the case caps 4 oriented upwardly, and knocked down backward in the feed direction by the knock-down member 99. The encased products 5 are then successively fed in this attitude (second attitude) (see FIG. 1).

The encased products 5 are fed in the second attitude to the packaging station 20. As with the abreast-arrayed shrink-packaged product 7a, three encased products 5 are shrink-packaged by the shrink sheet 6b, producing the tandem-arrayed shrink-packaged product 7b. The shrink sheet 6b has the perforations 100b already defined therein.

The tandem-arrayed shrink-packaged product 7b is then fed to the packing station 22, where the outer pack 8b is temporarily sealed (first seal) by the pillow packaging device 130 and then finally sealed (second seal) by the tightening device 132. In the final sealing process, as with the abreast-arrayed shrink-packaged product 7a, the outer pack 8b is tightened and sealed around the tandem-arrayed shrink-packaged product 7b, producing the packed product 9b. The packed product 9b is then cooled by the cooling device 180 and trimmed by the blanking device 182. Thereafter, the packed product 9b is fed successively to and processed by the corrugated case packing station 26, the printing and weight checking station 184, and the palletizing station 28 (see FIG. 2).

In the present embodiment, as described above, the encased products 5 are forcibly arrayed to orient the case caps 4 upwardly by the rollers 34a, 34b. Thereafter, in the sorting station 18, the encased products 5 are sorted selectively into the first and second feed paths 14, 16 depending on the packaged pattern, i.e., the abreast-arrayed shrink-packaged product 7a or the tandem-arrayed shrink-packaged product 7b.

In the first delivery unit 80 of the first feed path 14, the encased products 5 are fed with the case caps 4 oriented upwardly. In the second delivery unit 82 of the first feed path 14, the encased products are reversed 180° to direct the case caps 4 downwardly, after which they are arranged alternately, one by one, with the encased products 5 delivered from the first delivery unit 80 (first attitude).

In the second feed path 16, the encased products 5 are fed with the case caps 4 oriented upwardly by the second conveyor line 54. While the encased products 5 are being thus fed, they are knocked down backward in the feed direction by the knock-down member 99, and delivered to the packaging station 20 in this attitude (second attitude).

In the packaging station 20, the encased products 5 is delivered as they are automatically arrayed into the first attitude, i.e., the abreast-arrayed pattern, and the second attitude, i.e., the tandem-arrayed pattern, for automatically packaging the abreast-arrayed shrink-packaged product 7a and the tandem-arrayed shrink-packaged product 7b.

Therefore, the entire packaging operation is performed easily automatically and efficiently as compared with the conventional process of only automatically packaging the abreast-arrayed shrink-packaged product 7a and the conventional process of manually packaging the tandem-arrayed shrink-packaged product 7b. Since the abreast-arrayed shrink-packaged product 7a and the tandem-arrayed shrink-packaged product 7b are selectively and automatically packaged by the single automatic packaging apparatus 10, the overall facility required is smaller in size and more economical than if dedicated machines are used to package the abreast-arrayed shrink-packaged product 7a and the tandem-arrayed shrink-packaged product 7b, respectively.

When encased products 5 are to be arrayed abreast, the case caps 4 of adjacent encased products 5 are oriented in different directions. Therefore, if a certain number of, e.g., five, encased products 5 are to be arrayed abreast, the overall encased products 5 are kept in a stable shape, allowing the abreast-arrayed shrink-packaged product 7a to be shrink-packaged smoothly and reliably. Since the five encased products 5 are pressed and held by the two round belts 124a, 124b of the presser 116, the abreast-arrayed shrink-packaged product 7a can be shrink-packaged reliably.

As shown in FIG. 14, for packing the abreast-arrayed shrink-packaged product 7a with the outer pack 8a, the first seal region 162a of the hanger 160 closer to the abreast-arrayed shrink-packaged product 7a is sealed by the first

heater block 164, and, after elapse of a certain period of time, the second seal region 166 positioned outwardly of the first seal region 162 is sealed by the second heater block 168. Thus, the outer pack 8a is tightened and finally sealed over the abreast-arrayed shrink-packaged product 7a. The packed product 9a can be made compact with the abreast-arrayed shrink-packaged product 7a firmly held in position in the outer pack 8a against wobbling movement.

The first feed path 14 for arraying the encased products 5 to package them in the first attitude has the first and second screws 88, 90, and the guides 96 for reversing the encasing products 5 by 180° are combined with the second screw 90. Therefore, the entire structure of the first feed path 14 is effectively simplified, allowing the encased products 5 oriented alternately in opposite directions to be arrayed reliably in the second attitude with an inexpensive arrangement.

In the present embodiment, the abreast-arrayed shrink-packaged product 7a is made up of five encased products 5. However, the abreast-arrayed shrink-packaged product 7a may be made up of two through five encased products 5. The tandem-arrayed shrink-packaged product 7b may be made up of two encased products 5.

In the method of and the apparatus for automatically packaging encased products, the encased products are selectively sorted into the first feed path or the second feed path depending on the packaging pattern, and thereafter

the encased products are arrayed in the first attitude or the second attitude and automatically packaged by the packaging sheet. Therefore, the encased products can selectively and automatically be packaged in the different first and second attitudes, e.g., the abreast-arrayed pattern and the tandem-arrayed pattern. The overall packaging process is easily made efficient, and the facility required to perform the packaging process is reduced in size and made economical.

Although a certain preferred embodiment of the present invention has been shown and described in detail, it should be understood that various changes and modifications may be made therein without departing from the scope of the appended claims.